

Editorial

Discrete Dynamics of Nonlinear Systems in Nature and Society

Jorge E. Macías-Díaz ¹, **Qin Sheng** ², **Stefania Tomasiello** ³, and **Ahmed S. Hendy**^{4,5}

¹Departamento de Matemáticas y Física, Universidad Autónoma de Aguascalientes, Ags. 20131, Mexico

²Department of Mathematics, Baylor University, Waco, TX 76798-7328, USA

³Consorzio di Ricerca Sistemi ad Agenti, Università degli Studi di Salerno, 84084 Fisciano, Salerno, Italy

⁴Department of Computational Mathematics and Computer Science, Institute of Natural Sciences and Mathematics, Ural Federal University, 19 Mira St., Yekaterinburg 620002, Russia

⁵Department of Mathematics, Faculty of Science, Benha University, Benha, 13511, Egypt

Correspondence should be addressed to Jorge E. Macías-Díaz; jemacias@correo.uaa.mx

Received 9 December 2018; Accepted 10 December 2018; Published 3 January 2019

Copyright © 2019 Jorge E. Macías-Díaz et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Discrete nonlinear systems have become increasingly important in the past decades. To understand them, new analytical and numerical methodologies have been proposed. More accurate predictions of the solutions of systems related to physical problems are investigated in that way. It is worth noting that qualitative and quantitative features of discrete nonlinear modeling problems and simulation techniques have attracted a significant amount of attention from researchers in different branches of applied sciences. This is due to the fact that features of the solutions are crucial to our understanding of many important phenomena in nature and society. In fact, the science and engineering communities have benefited tremendously from recent progress in the area. Interactions between the praxis and new mathematical methodologies have also reached a new high level.

Based on the above, this special issue aims at keeping track of the most relevant developments in the analysis and simulations of discrete nonlinear systems that appear in nature and society. More precisely, we pay special attention to analytical features of the solutions of the systems as well as the analysis of interactive computational strategies. Both deterministic and stochastic paradigms arising from nature and society are of interest, and pertinent applications to the resolution of realistic problems are studied. Continuous methods are within our interest as far as they provide helpful or insightful tools for the analysis. Challenging issues pertaining to the analysis of (integer- and fractional-order) partial differential equations and underlying approximation techniques are also of high relevance.

There are 49 research papers being received and undergone thorough peer-reviewing processes. There are 15 articles accepted and published in this special issue. They represent the most recent developments in the fields, with applications to sciences and technologies. The contributions focus primarily on issues that include the following:

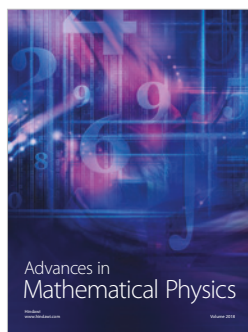
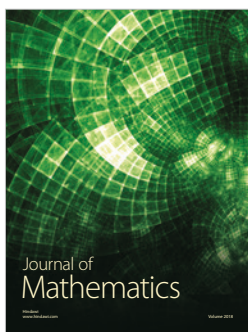
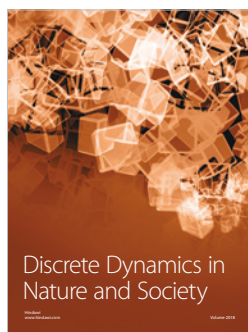
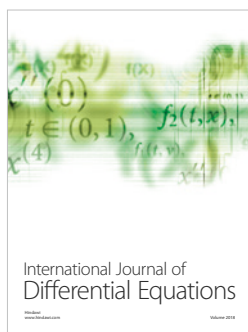
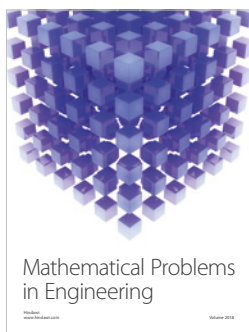
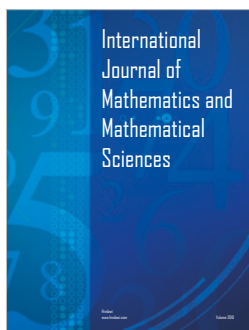
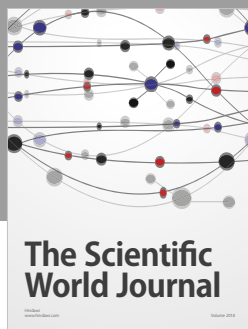
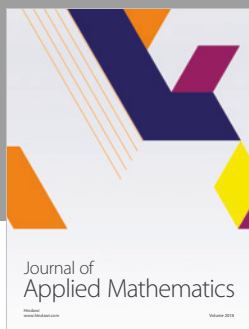
- (i) solvable time-inconsistent principal-agent problems;
- (ii) non-smooth vibration characteristics of gear pair systems with periodic stiffness and backlash;
- (iii) applications of the general residual power series method to problems with variable coefficients;
- (iv) Laplace transform method for pricing American CEV Strangles option with two free boundaries;
- (v) Triopoly dynamic games with free or bundling markets in telecommunication industry;
- (vi) Ising models of user behavior decision in network rumor propagation;
- (vii) uniqueness of the solution for a class of differential system with coupled integral boundary conditions;
- (viii) asymptotic properties of solutions to second-order difference equations of Volterra type;
- (ix) positive periodic solutions for generalized epidemic models with time-varying coefficients and delays;
- (x) spatial dynamics for generalized Solow growth models;

- (xi) uniqueness and finite-time stability of solutions for nonlinear fractional delay difference systems;
- (xii) evolution of electoral preferences for regimes of three political parties;
- (xiii) hybrid ant colony optimization for dynamic multidepot vehicle routing problem;
- (xiv) optimal control strategies for discrete-time smoking models with saturated incidence rates;
- (xv) mean-square stability of semi-implicit Euler methods for the model of technology innovation network.

Conflicts of Interest

The guest editors of this special issue report no potential conflicts of interest.

Jorge E. Macías-Díaz
Qin Sheng
Stefania Tomasiello
Ahmed S. Hendy



Submit your manuscripts at
www.hindawi.com